(12) UK Patent Application (19) GB (11) 2 321 207 (13) A

(43) Date of A Publication 22.07.1998

(21) Application No 9804523.0

(22) Date of Filing 25.02.1997

Date Lodged 03.03.1998

(30) Priority Data
(31) 19608969 (32) 08.03.1996 (33) DE

(62) Divided from Application No 9703830.1 under Section 15(4) of the Patents Act 1977

(51) INT CL[6]
B24B 23/04

(52) UK CL (Edition P)
B3D DJP D221

(56) Documents Cited
EP 0138278 A

(58) Field of Search
UK CL (Edition P) B3D
INT CL[6] B24B , B25F

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(54) Abstract Title
Electric hand held grinding machine

(57) In an electric hand-held grinding machine with a two-shell plastic machine housing (10) which receives an electric motor with an output shaft and an eccentric peg to drive a two part grinding plate (60) the underside of which is prepared for receiving grinding means, oscillating elements (61) secure the grinding plate (60) in position on the machine housing (10). The grinding plate (60) consisting of two plate halves (62, 63) which are put together along a partition line (64) extending in the plane of the housing partition line (11). One grinding plate half (62, 63), in each case, and half of the oscillating elements (61) are moulded onto a housing shell (12, 13) in one piece, and the two housing shells (12, 13) and two plate halves (62, 63) are connectable to one another along their partition lines (11, 64) by latching elements which are moulded on in one piece.

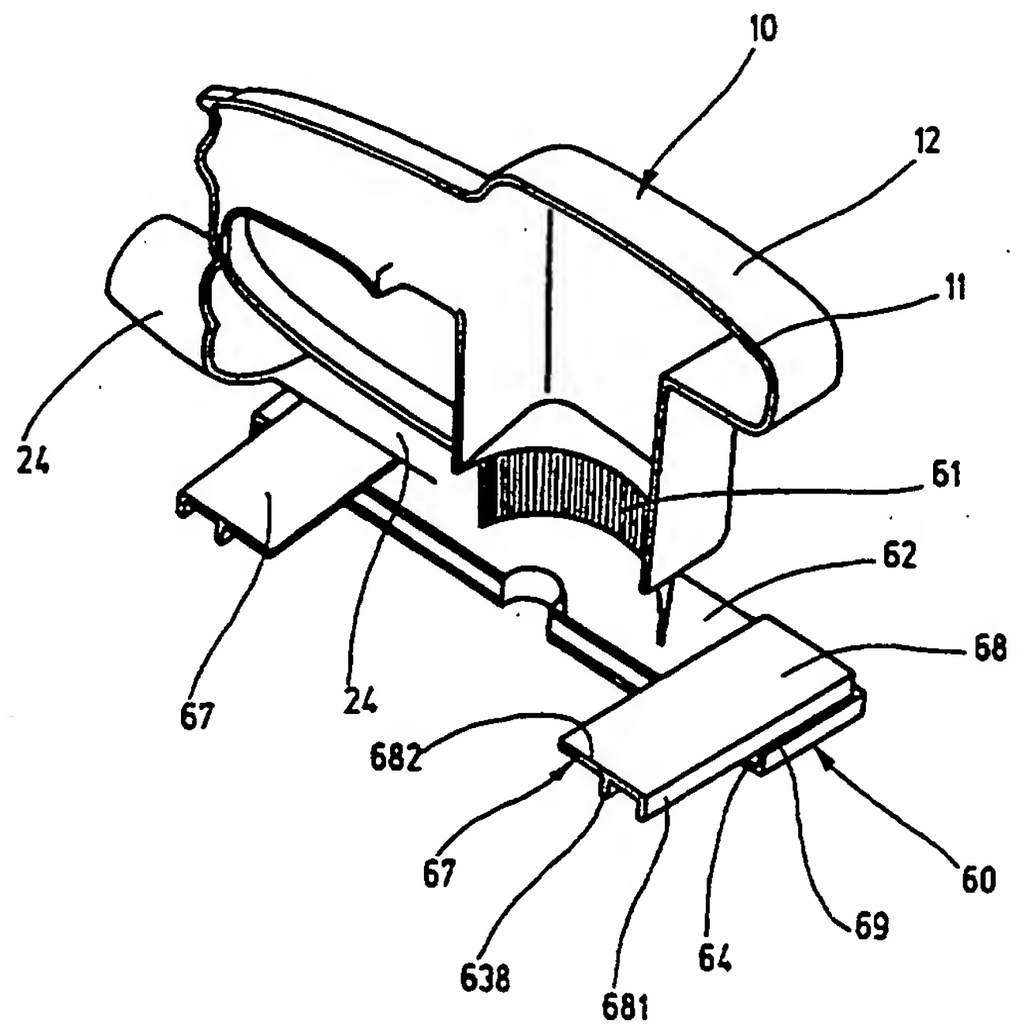

Fig. 8

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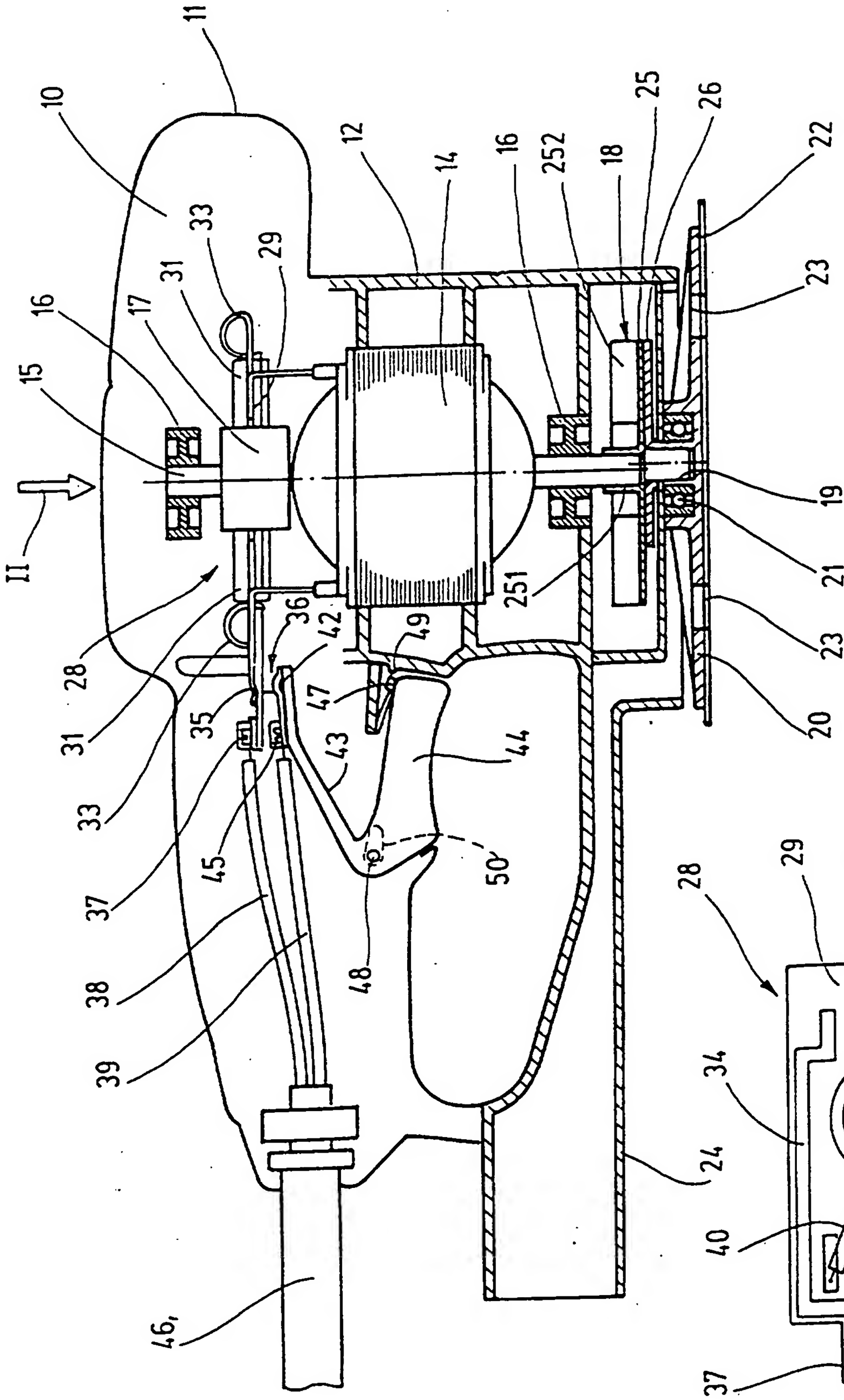
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Fig. 1

Fig. 2

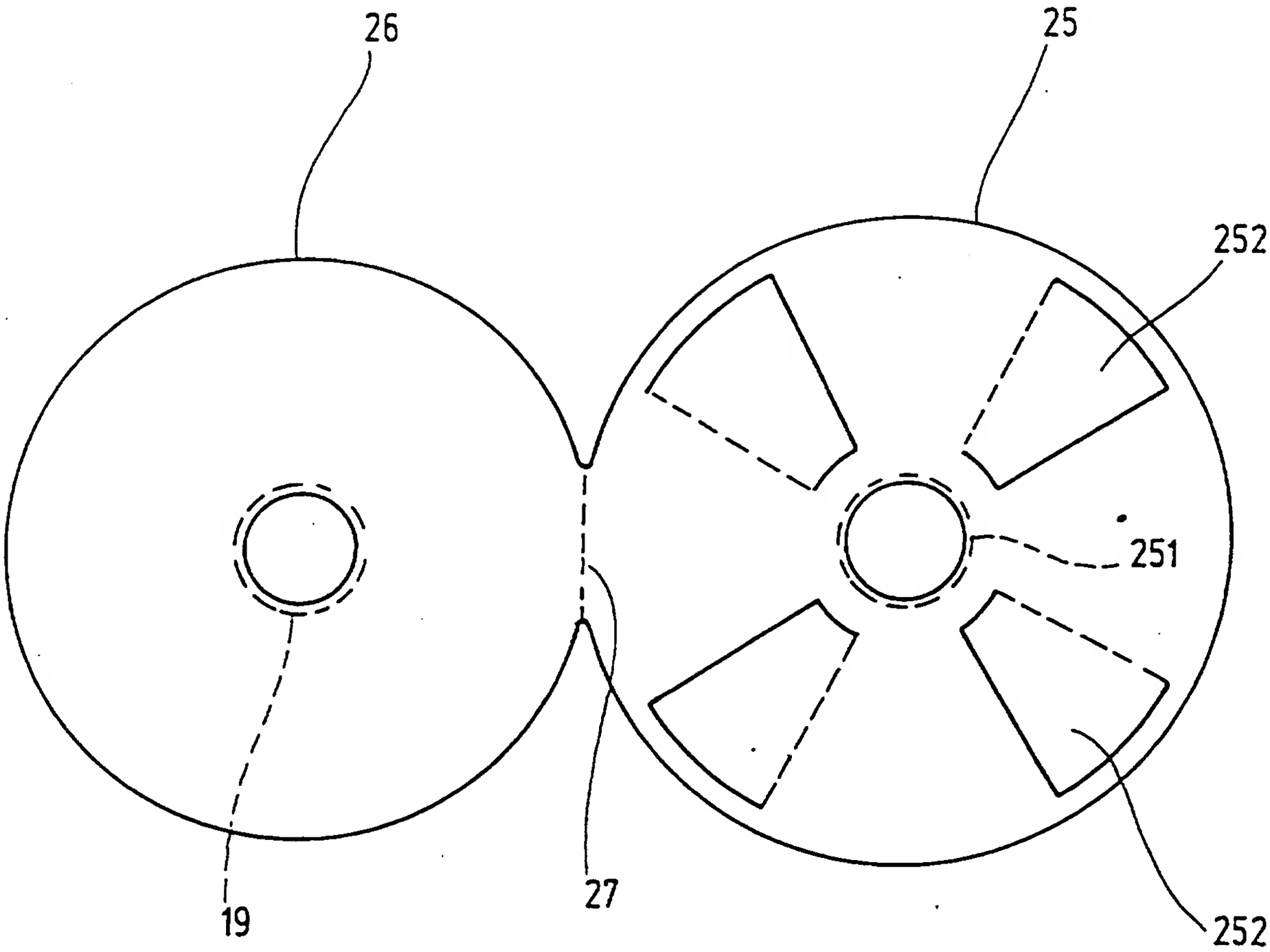

Fig. 3

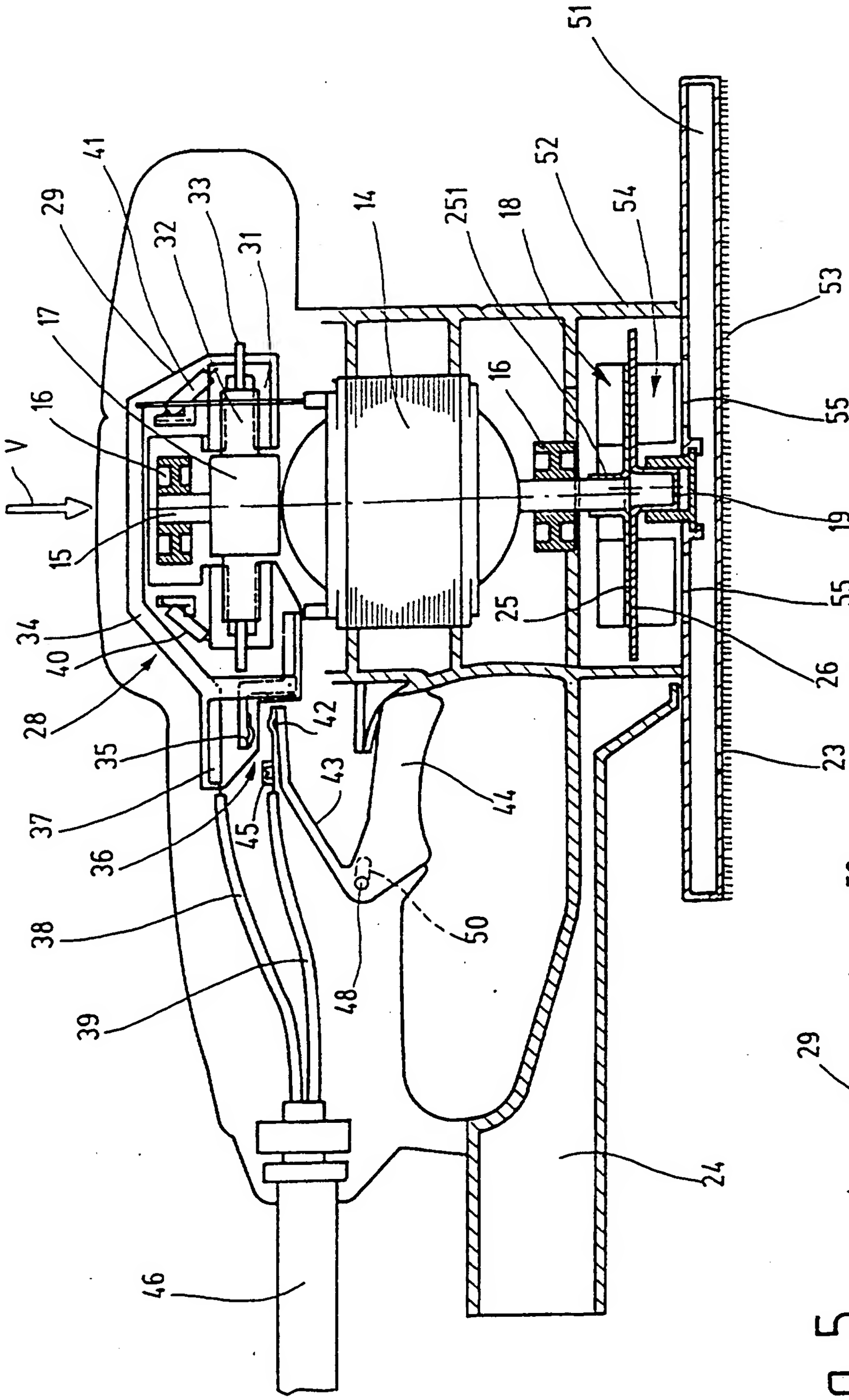
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Fig. 4

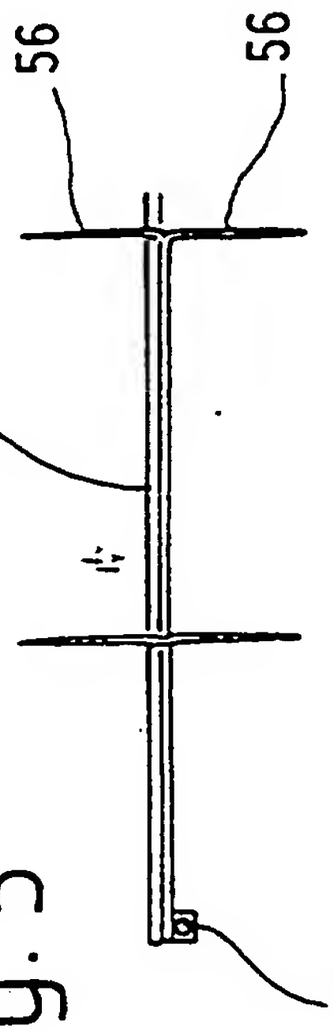
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Fig. 5

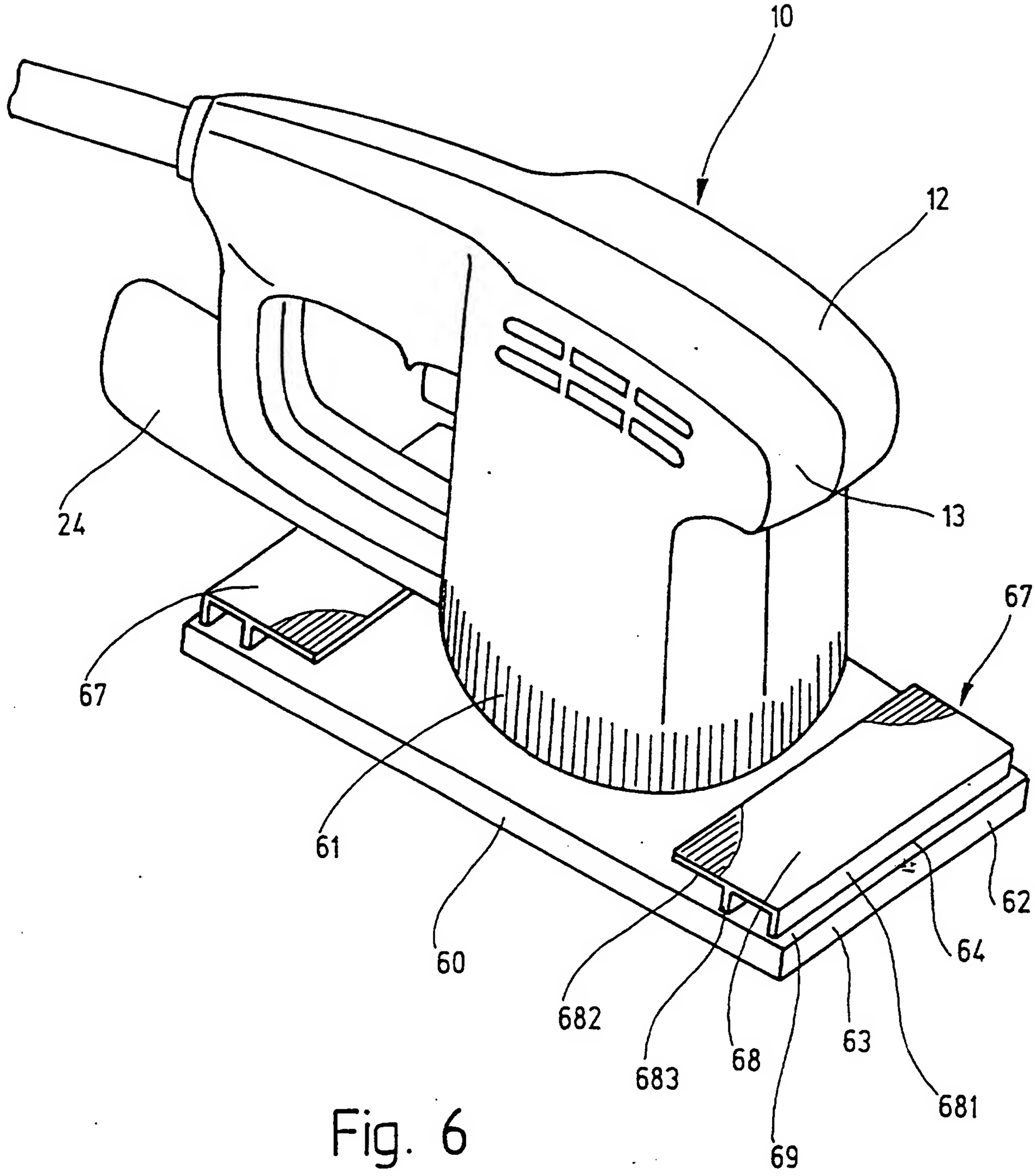

Fig. 6

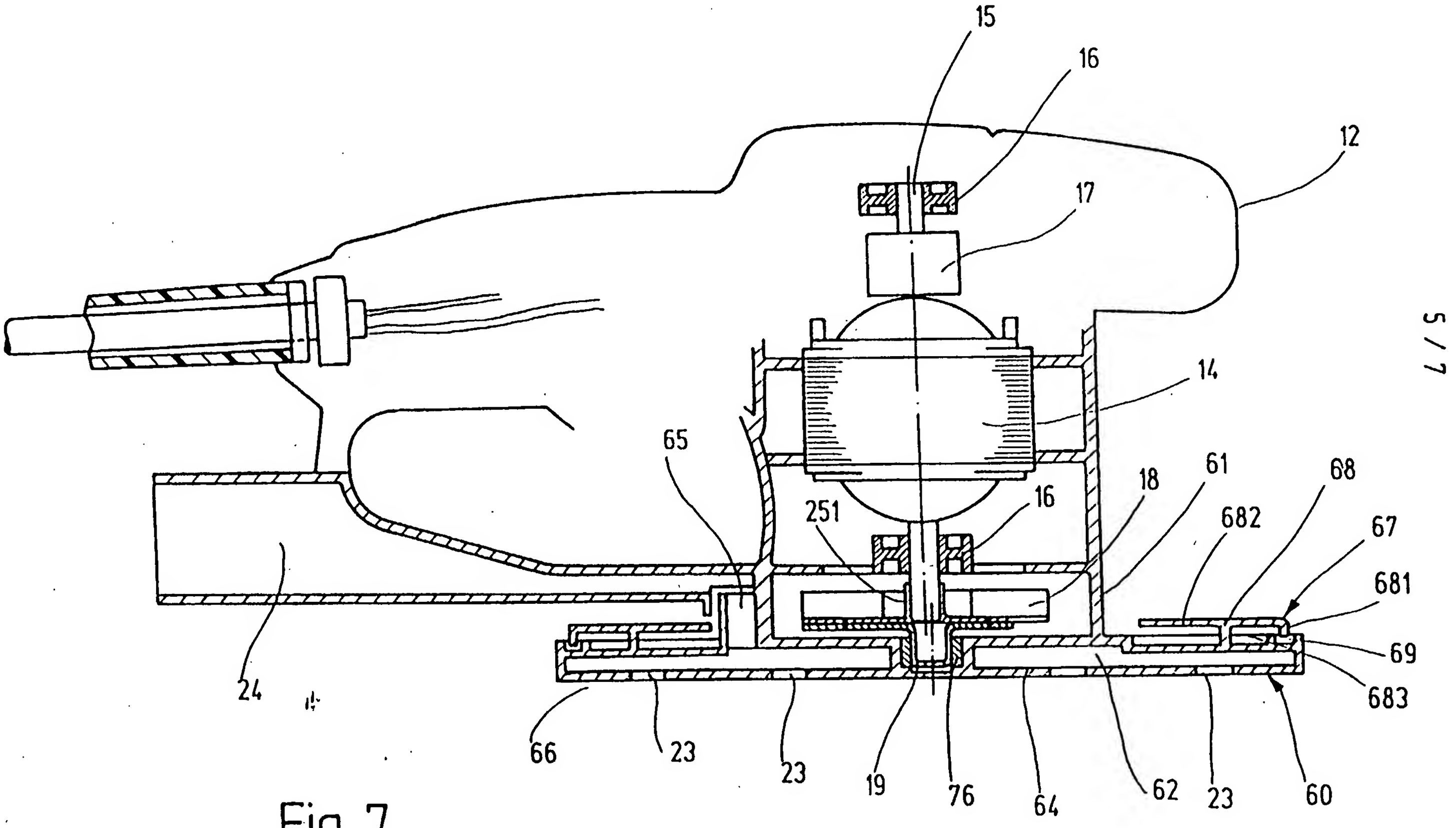
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Fig. 7

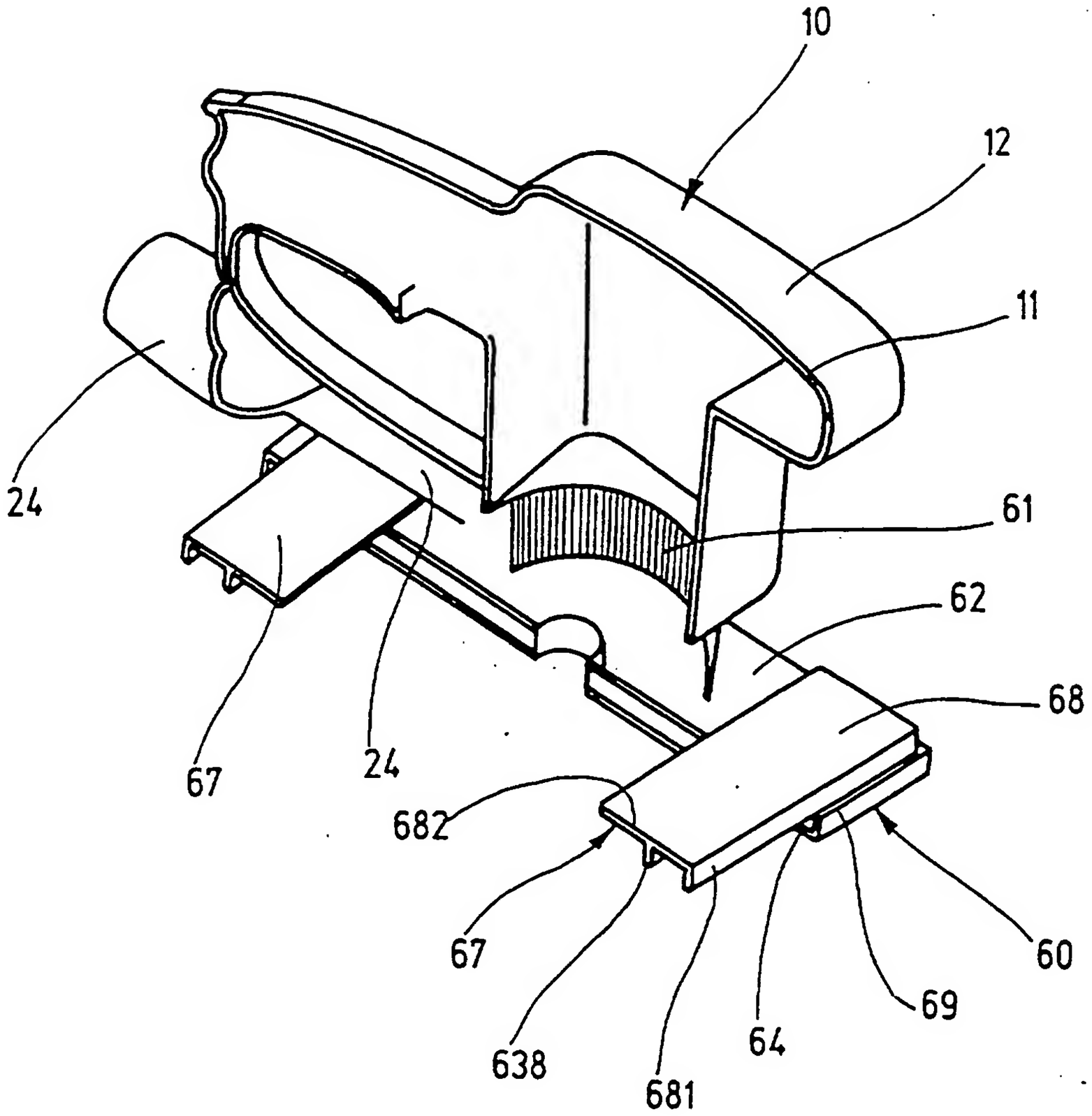

Fig. 8

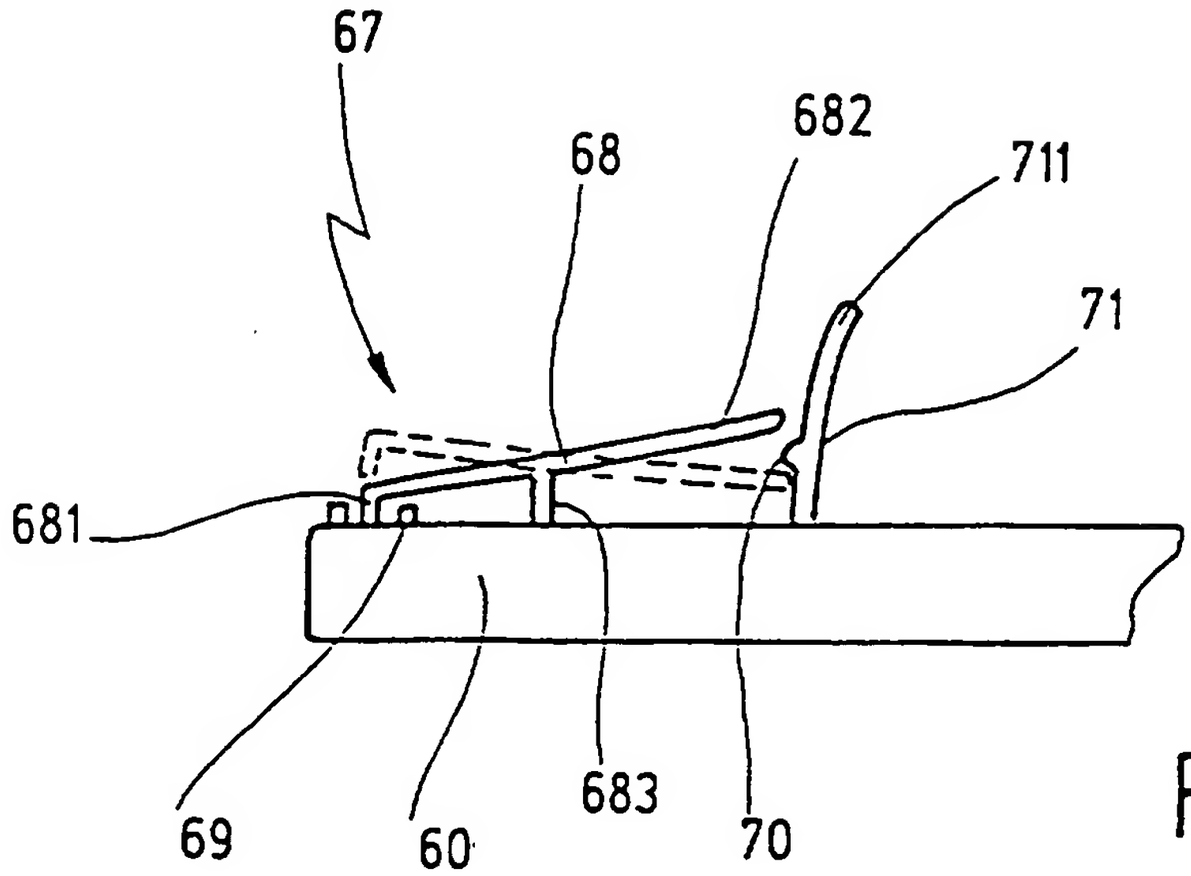

Fig. 9

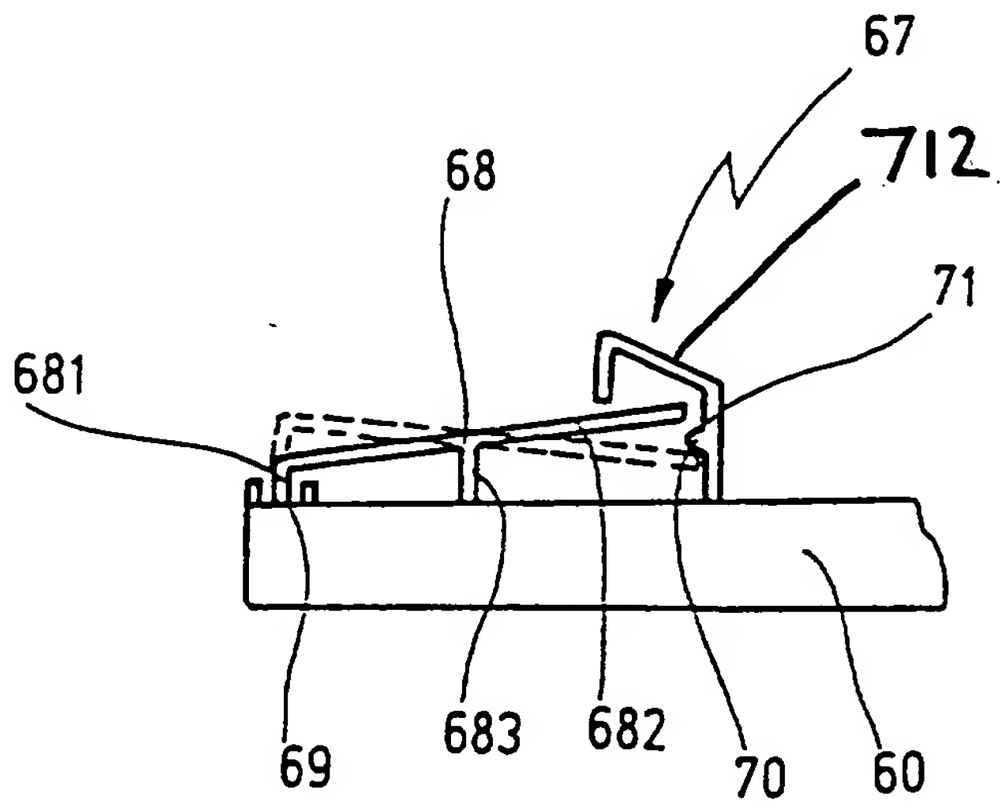

Fig. 10

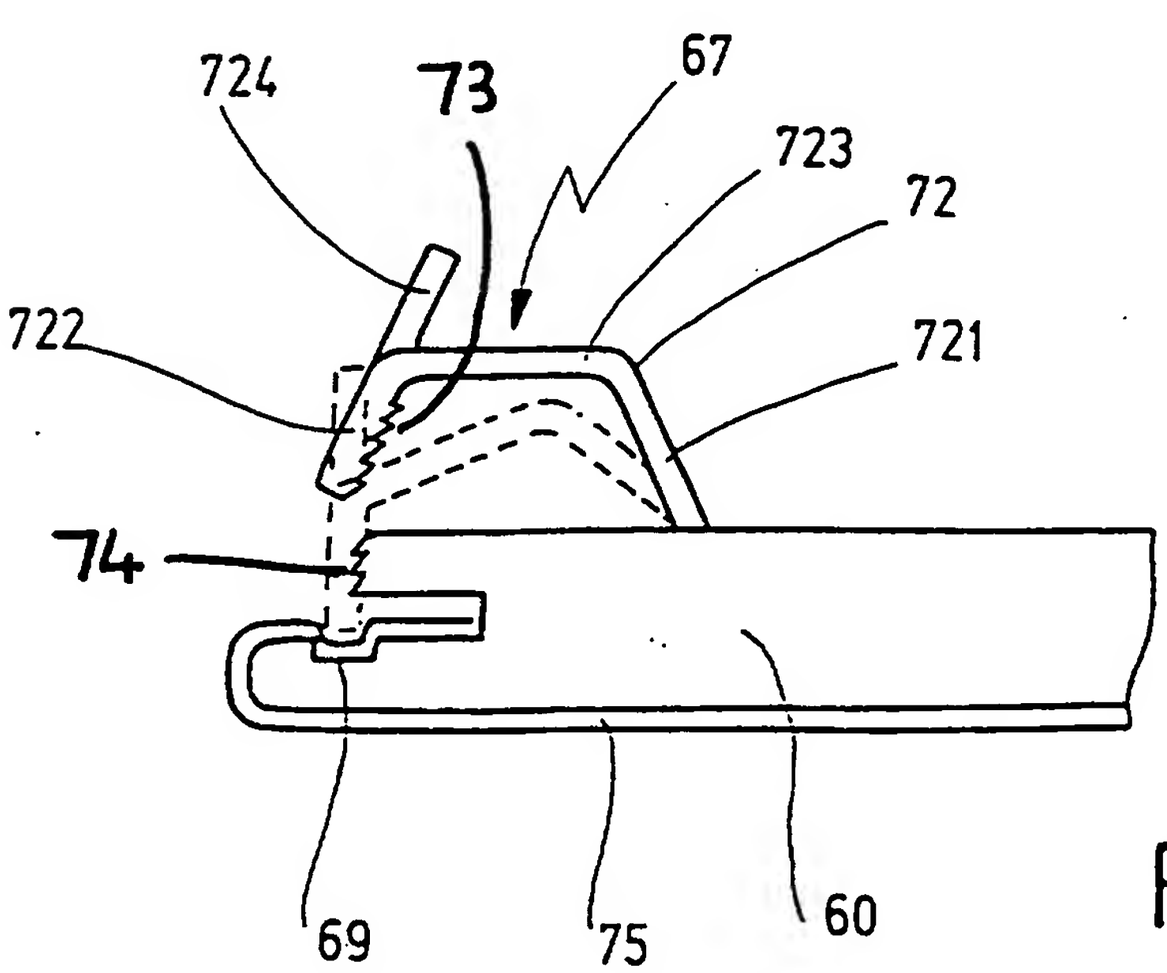

Fig. 11

Electric hand-held grinding machine

The present invention relates to electric hand-held grinding machines.

EP 0610801 A1 discloses an electric hand-held grinding machine which is constructed as an oscillating grinder. In this oscillating grinder, the grinding plate is of triangular construction and is secured in position on the machine housing via oscillating elements, so that, as a result of the rotating eccentric peg, it performs a grinding movement which only goes backwards and forwards. The grinding plate is subdivided into a tray-holder and a grinding tray which is fastened to the latter in a detachable manner. The tray-holder is mounted on the eccentric cam in a rotating manner and secured, via the oscillating elements which are in one piece with it and, at the ends, are received in a form-locking manner in recesses in the housing of the machine, against being entrained in rotation. On its lower side which faces away from the tray-holder, the grinding tray carries grinding means, for example a disc of grinding paper.

According to the present invention there is provided an electric hand-held grinding machine comprising a machine housing in which is received an electric motor with an output shaft, the housing consisting of two plastic housing shells which are put together along a partition line lying in one plane with the axis of the housing; an eccentric peg which protrudes from the machine housing and is driven by the output shaft of the electric motor; a grinding plate which is received on the protruding end of the eccentric peg and the underside of which is prepared for receiving grinding means; oscillating elements for securing the grinding plate in position on the machine housing; clamping means disposed on the grinding plate for clamping fast the grinding means; and a fan wheel for cooling the electric motor, wherein the grinding plate consists of two plate halves which are put together along a partition line extending in the plane of the partition

line of the housing, one grinding plate half and half of the oscillating elements in one piece onto each housing shell and the two housing shells and the two plate halves being connectable to one another along their partition lines.

An electric hand-held grinding machine in accordance with the invention has the advantage that the machine housing, the grinding plate and the oscillating elements form one unit made of plastic in the shell type of construction. The two halves of the plastic structural unit, which are produced separately, are simply placed against one another, after the insertion of the internal components, and notchingly connected to one another by pressure. The tool-less final assembly is time-saving and can be automated without any problems. Dismantling by the customer, and therefore incorrect repairing, is no longer possible. The number of points of interlocking by the moulded-on latching elements can be selected in any desired manner without additional costs.

A further reduction in costs ensues if the clamping-fast means for the grinding means are also moulded onto at least one of the grinding plate halves when it is moulded. Under these circumstances, the clamping-fast means can be of very different design, such as is indicated in detail in other forms of embodiment of the invention in accordance with other claims.

In order that the invention may be well understood, there will now be described some embodiments thereof, given by way of example, reference being made to the accompanying drawings, in which:

Figure 1 is a longitudinal section through an eccentric-type grinder with external dust-extraction, partly in schematised form;

Figure 2 is a plan view of a brush-holder belonging to the eccentric-type grinder, in the direction of the arrow II in Figure 1;

Figure 3 is a plan view of a stamped sheet-metal section for manufacturing the fan wheel and eccentric peg of the eccentric grinder in Figure 1;

Figure 4 is a longitudinal section through an oscillating grinder with

its own dust-extraction system, partly in schematised form;

Figure 5 is a plan view of a brush-holder belonging to the oscillating grinder, in the direction of the arrow V in Figure 4;

Figure 6 is a representation, in perspective, of an oscillating grinder;

Figure 7 is a longitudinal section through the oscillating grinder in Figure 6, partly in schematised form;

Figure 8 is a perspective representation of a housing shell belonging to the oscillating grinder of Figures 6 and 7; and

Figures 9 to 11 are, in the form of a detail in each case, a side view of a gripping element for clamping grinding paper fast on the oscillating grinder of Figures 6 and 7, in accordance with three other exemplified embodiments.

Referring first to Figure 1, there is shown an eccentric grinder as an example of an electric hand-held grinding machine, having a machine housing 10 which consists of two housing shells 12, 13 made of plastic which are put together along a partition line 11 (cf. figure 6). In figure 1, only the left-hand housing shell 12 of the machine housing 10 is represented. Under these circumstances, the partition line 11 lies in one plane with the axis of the housing. An electric motor 14, which in this case is constructed as a commutator motor and the output shaft 15 of which is rotatably received in two bearing brackets 16 moulded onto the housing shells 12, 13, is received in the machine housing 10. Seated in a non-rotatable manner on the output shaft 15 are, at one end, the commutator 17 and, at the other end, the fan 18 for cooling the motor. The output shaft 15 acts, in a non-rotatable manner, on an eccentric cam 19 which protrudes on the underside of the machine housing 10 and receives, on the protruding end, a circular grinding tray 20. Under these circumstances, a ball bearing 21 is disposed between the eccentric peg 19 and the grinding tray 20. On its underside which faces away from the machine housing 10, the grinding tray 20 carries a hook and loop-type lining for adhesively receiving a grinding disc 22 made of grained paper. For dust-extraction purposes, the grinding tray 20, like the grinding disc 22, has extraction

holes 23 through which the grinding dust is extracted via a dust conduit 34 which is moulded onto the machine housing 10 and which, in turn, has to be connected to an external blower.

In order to reduce production costs, the fan wheel 18 and the eccentric peg 19 consist of a stamped sheet-metal part 25, 26 in each case. As is illustrated in figure 3, the two stamped sheet-metal parts 25, 26 are manufactured with a common sheet-metal stamping tool in one stamped sheet-metal section. In the process, a concentric collar 251 is formed out on the stamped sheet-metal part 25, while the eccentric peg 19 is pressed out on the stamped sheet-metal part 26 after the fashion of a collar. In addition, fan blades 252 are also stamped clear in the stamped sheet-metal part 25 and bent off at right angles from the stamped sheet-metal part 25 around their base line. The stamped sheet-metal part 26 is now folded up around the bending line 27 onto the rear side of the stamped sheet-metal part 25, and fixedly connected to the latter. As a result of the bending-over operation, the eccentric peg 19 automatically has the desired eccentricity in relation to the collar 251. Obviously it is also possible to separate the two stamped sheet-metal parts 25, 26 from one another, lay them one on top of the other with the desired eccentricity of the eccentric peg 19 and collar 251, and connect them fixedly to one another (cf. figure 4). The structural unit representing the fan wheel 18 for cooling the motor and the eccentric peg 19 for driving the grinding tray is pushed, as illustrated in figure 1, onto the free end of the output shaft 15 projecting above the lower bearing bracket 16, and is fixed thereon.

Belonging to the electric motor 14 is a brush-holder 28 which, in this case, is formed by a plastic carrier plate 29 which is represented in plan view in figure 2. The plastic carrying plate 29 has a central, circular opening 30 for the commutator 17 of the electric motor 14 to pass through. Moulded onto the plastic carrying plate 29 in one piece, diametrically in relation to the opening 30, are two brush shoes 31 in which there is located in each case, in an axially displaceable manner, a carbon brush 32 which is pressed, at the front end, against the surface

of the commutator by a spring 33 for pressing-on the brush. For conducting electric current, there is fastened to the plastic carrying plate 29 a stamped brass part 34 on which a contact tongue 35 belonging to an electric switch 36 for switching the electric motor 14 on and off protrudes, and a connecting screw 37 for fastening an electrical connecting line 38 is tapped in. The two carbon brushes 32, and also a choke coil 40 and a capacitor 41 for radio interference suppression, are connected to the stamped brass part 34. The second contact of the electrical switch 36, which contact corresponds with the contact tongue 35, is fastened, in the form of a sheet-metal contact 42, to the end section of a resilient web 43 which is moulded in one piece onto a push-button 44 made of plastic for the manual actuation of the switch. During the switching-on and switching-off operation, the web 43 must be moved, by additional springing means which are not represented, into its switching position in a particularly accelerated manner, so that no arc or burning-away of the contacts occurs. A connecting screw 45 for fastening the second connecting line 39 of an electrical connecting cable 46 introduced into the machine housing 10 is screwed into the sheet-metal contact 42. Also moulded in one piece onto the plastic push-button 44 are a notching nose 47 and a transversely projecting pin 48. The notching nose 47 corresponds with an indentation 49 in the machine housing 10 for locking the push-button 44 with the switch 36 closed, and the pin 48 corresponds with a slot-like recess 50 which is moulded into the machine housing 10 and is indicated in broken lines in figure 1. By displacement of the pin 48 within the recess 50, the push-button 44 can be locked and unlocked again by means of the notching nose 47 and indentation 49 when the electrical switch 36 is in the closing position.

When the machine housing 10 is put together from the two housing shells 12 and 13, the plastic carrying plate 29 is received by grooves which are constructed in a corresponding manner in the two housing shells 12,13. The plastic carrying plate 29 is thus automatically clamped fast in the machine housing 10 when the two housing shells 12, 13 are interlocked along the partition line 11.

The push-button 44 with the web 43 for actuating the electrical switch 36 is held in a movable manner in the machine housing 10 after the housing shells 12, 13 have been put together.

The electric hand-held machine tool which can be seen in longitudinal section in figure 4 is an oscillating grinder which carries, instead of the round grinding tray 20, a rectangular grinding plate 51 which is seated centrally on the eccentric peg 19 and is secured in position on the machine housing 10 via oscillating elements 52, so that it performs a backward and forward grinding movement when the eccentric peg 19 rotates. On its underside which faces away from the machine housing 10, the grinding plate 51 carries a hook and loop-type lining 53 for fastening grinding paper in a detachable manner. In this oscillating grinder too, provision is made for the extraction of the grinding dust, for which purpose the grinding plate 51 is of hollow design and once again has extraction holes 23 on its underside. Seated on the eccentric peg 19 is a fan wheel 54 which draws in air from the underside of the grinding plate 51, via the extraction holes 23 and via transition holes 55 in the upper side of the grinding plate 51, and forces it into the dust conduit 24. In the case of the oscillating grinder according to figure 4, as in the eccentric grinder according to figure 1, the fan wheel 18 for cooling the motor and the eccentric peg 19 are again formed from the two stamped sheet-metal parts 25, 26. At the same time, the fan wheel 54 for the extraction of dust is also formed-out from the stamped sheet-metal part 26 for the eccentric peg 19, that is to say similarly to the way in which the fan wheel 18 for cooling the motor is formed-out from the stamped sheet-metal part 25.

The brush-holder 28 is constructed, in the same way as in the eccentric grinder in figure 1, as a plastic carrying plate 29, although in this case it is orientated parallel to the output shaft 15 of the electric motor 14 and is clamped into the machine housing 10 via webs 56 (figure 5). The plastic carrying plate 29 carries, in the same way, two brush shoes 31 for receiving a carbon brush 32 in each case, two springs 33 for pressing-on the brushes, a stamped brass part

34 with a contact tongue 35 and connecting screw 37, and also a choke coil 40 and capacitor 41. The electrical switch 36, with the push-button 44 for actuating it, is constructed in the same way as in the eccentric grinder in figure 1. Components which are identical in the electric hand-held grinding machines in figures 1 and 4 are provided with the same reference symbols.

In the oscillating grinder which is represented in perspective in figure 6 as an exemplified embodiment of an electric hand-held grinding machine, the machine housing 10 is put together from two housing shells 12, 13 which abut against one another along a partition line 11. The partition line 11 and the longitudinal axis of the machine housing 10 lie in the same plane. A grinding plate 60 is secured in position on the machine housing 10 via oscillating elements 61. As is also made clear, in particular, by the perspective representation of the housing shell 12 in figure 8, the grinding plate 60 is put together from two plate halves 62, 63 which meet along a partition line 64. In this instance, the partition line 64 lies in the same plane with the partition line 11 of the housing shells 12, 13. Each plate half 62 and 63 respectively, and the half of the oscillating elements 61 in each case, are moulded in one piece onto a housing shell 12 and 13 respectively. In this instance, the oscillating elements 61 are formed by plastic webs which are disposed at a distance from, and parallel to, one another on a semicircular arc and extend between the grinding plate 60 and the machine housing 10. Moulded onto the housing shells 12, 13 and the plate halves 62, 63, along their partition lines 11 and 64 respectively, are latching elements which are not represented here but which correspond with one another, engage in one another when the housing shells 12, 13 and the plate halves 62, 63 are placed against one another, and are notchingly connected to one another by being pressed together. After that, dismantling of the machine housing 10 is possible only with a special tool.

As becomes apparent from the sectional representation of the oscillating grinder in figure 7, there is received in the machine housing 10 an

electric motor 14 which is constructed as a commutator motor and the output shaft 15 of which is mounted in two bearing brackets 16. Seated on the output shaft 15 in a non-rotatable manner are, at one end, a commutator 17 and, at the other end, a fan wheel 18 for cooling the motor and also an eccentric peg 19 for driving the grinding plate 60. Representation of the brush-holder for the commutator 17 and of the electrical switch for the switching-on and switching-off of the electric motor 14 with a manual push-button for operating the electrical switch has been dispensed with here. The fan wheel 18 and eccentric peg 19 consist of stamped sheet-metal parts which are connected to one another and are slipped, by means of a collar 251, onto the free end of the output shaft 15. The grinding plate 60, which is of hollow construction, is placed on the eccentric peg 19 via a sliding bearing 76. Since the grinding plate 60 is secured in position on the machine housing 10 via the oscillating elements 61 disposed concentrically with the output shaft 15, and is thus unable to perform any rotation, the rotating eccentric peg 19 produces a backward and forward vibrational movement of the grinding plate 60.

For the extraction of grinding dust, extraction holes 23 are provided in the underside of the hollow grinding plate 60 and a dust conduit 24 constructed in one piece on the machine housing 10 is connected into an extraction opening 65 on the upper side of the hollow grinding plate 60. The dust-extraction conduit 24 is, in turn, to be connected to an external extracting blower.

In order to secure grinding paper in position, a hook and loop-type lining 66 is injection-moulded to the underside of the grinding plate 60 in one piece with the latter. In addition or as an alternative to the hook and loop-type lining 66, two manually actuatable gripping elements 67 are provided which extend, transversely to the partition line 64, on the upper side which faces away from the underside of the grinding plate 60. Under these circumstances, the two gripping elements 67 extend, in each case, along one of the transverse edges of the grinding plate 60 and are moulded onto the plate half 62 of the latter in one piece. In this way, the housing shells 12, 13, the oscillating elements 61, the two plate

halves 62, 63 of the grinding plate 60, and the gripping elements 67 for fastening the grinding means are manufactured in one working operation with only two injection tools.

In the exemplified embodiment of the gripping elements 67 in figures 6 to 8, these are constructed as gripping strips 68 which are L-shaped in cross-section and the short leg 681 of which is pressed, by its front edge, onto a grinding paper contact face 69 constructed on the upper side of the grinding plate, while their long leg 682, which extends approximately parallel to the grinding plate 60, is secured in position on the said grinding plate 60 approximately centrally via a transverse web 683 extending parallel to the short leg 681.

Figures 9 to 11 represent other possible exemplified embodiments of the gripping elements 67. In figure 9, the gripping elements 67 are constructed, like the gripping elements 67 in figures 6 to 8, as gripping strips 68. In addition, a spring web 71 provided with a catch 70 is disposed on the upper side of the grinding plate 60, near the free end of the long leg 682 of the gripping strip 68. If the gripping strip 68 is lifted by pressing on the rear end of the long leg 682 for the purpose of inserting grinding paper, the free end of the said long leg 682 arrives under the catch 70 on the spring web 71, and the gripping strip 68 is held in an open position which is drawn in broken lines in figure 9 and in which its short leg 681 is lifted off from the grinding paper contact surface 69. Constructed on the spring web 71 in one piece is a handling tongue 711 by means of which the spring web 71 can be bent resiliently outwards for the purpose of lifting the gripping strip 68 out of the catch 70.

In the exemplified embodiment of the gripping element 67 according to figure 10, a spring web 71 with a catch 70 is likewise associated with the L-shaped gripping strip 68 fastened to the upper side of the grinding plate 60 via the transverse web 683. Instead of the handling tongue, however, there is moulded onto the spring web 71 in one piece a pressure plate 712 which engages over the long leg 682 of the gripping strip 68, from the free end of the said leg. If this

pressure plate 712 is pressed onto the long leg 682 of the gripping strip 68, the latter tilts about its transverse web 683. The short leg 681 lifts off from the grinding paper contact face 69, and the free end of the long leg 682 engages notchingly under the catch 70. The gripping strip 68 assumes the open position represented in broken lines in figure 10, and the grinding paper can be changed. If the pressure plate 712 is pressed onto the long leg 682 of the gripping strip 68 again, and at the same time is slightly displaced towards the rear, the long leg 682 becomes unnotched from the catch 70 and the gripping strip again presses, with the front edge of the short leg 681, onto the grinding paper or the grinding paper contact face 69.

The gripping element 67 outlined in figure 11 is constructed as a U-shaped, asymmetrical gripping bow 72, the longer leg 721 of the U of which is fastened in one piece, at the end, to the upper side of the grinding plate 60 and tends away upwards from the latter, while the shorter leg 722 of its U can be pressed, at the end, onto a grinding paper contact face 69 constructed on the grinding plate 60. The two legs 721, 722 of the U are connected to one another in one piece by a transverse web 723. On its inner side which faces towards the longer leg 721 of the U, the shorter leg 722 of the U carries a notching strip 73 which interacts with notching teeth 74 constructed on the grinding plate 60. Through the pressing-down of the gripping bow 72, the notching strip 73 engages in the notching teeth 74 and the gripping bow 72 can be pushed downwards, with notching engagement in stages, until the front end of the shorter leg 722 of the U presses (as represented in broken lines in figure 11) a grinding paper 75 onto the grinding paper contact 69. A handling part 724 which projects, as an extension of the shorter leg 722 of the U, above the transverse web 723 of the U-shaped gripping bow 72, serves to lift the notching strip 73 out of the notching teeth 74, so that the gripping bow 72 once again assumes, because of its spring action, its position which is represented in solid lines in figure 11. In this way, the grinding paper contact face 69 is cleared and the grinding paper 75 can be changed.

Reference is made to British application No. 9703830.1, published as GB 2110817, from which the present case has been divided.

CLAIMS

1. An electric hand-held grinding machine comprising a machine housing in which is received an electric motor with an output shaft, the housing consisting of two plastic housing shells which are put together along a partition line lying in one plane with the axis of the housing; an eccentric peg which protrudes from the machine housing and is driven by the output shaft of the electric motor; a grinding plate which is received on the protruding end of the eccentric peg and the underside of which is prepared for receiving grinding means; oscillating elements for securing the grinding plate in position on the machine housing; clamping means disposed on the grinding plate for clamping fast the grinding means; and a fan wheel for cooling the electric motor, wherein the grinding plate consists of two plate halves which are put together along a partition line extending in the plane of the partition line of the housing, one grinding plate half and half of the oscillating elements being moulded in one piece onto each housing shell, and the two housing shells and the two plate halves being connectable to one another along their partition lines.

2. A machine as claimed in claim 1, wherein latching elements are moulded onto the two housing shells and the two plate halves for connecting one another together along their partition lines.

3. A machine as claimed in claim 1 or claim 2, wherein the grinding means is grinding paper.

4. A machine as claimed in any of claims 1 to 3, wherein elements are formed by plastic webs which extend between the machine housing and the grinding plate at a distance from one another, parallel to one another and concentrically with the output shaft of the electric motor.

5. A machine as claimed in any of the preceding claims, wherein the clamping means are moulded at least onto one grinding plate half in one piece.

6. A machine as claimed in claim 5, wherein the clamping means have two manually actuatable gripping elements which extend on the upper side, which faces away from the underside of the grinding plate, of the said grinding plate, transversely to the partition line of the plate halves, over the entire width of the grinding plate and close to the transverse edge thereof in each case, and the gripping elements are moulded onto the one plate half in one piece.

7. A machine as claimed in claim 6, wherein each gripping element has a gripping strip which is L-shaped in cross-section and the short leg of which is pressed, by its front edge, onto a grinding paper contact face constructed on the upper side of the grinding plate, while its long leg, which extends approximately parallel to the grinding plate, is secured in position on the said grinding plate substantially centrally via a transverse web extending parallel to the short leg.

8. A machine as claimed in claim 7, wherein near the free end of the long leg of the L-shaped gripping strip there is moulded in one piece onto the upper side of the grinding plate a spring web, which is provided with a catch, for locking the gripping strip in its open position in which the front edge of the short leg is lifted off from the grinding plate.

9. A machine as claimed in claim 8, wherein the spring web has a handling tongue for the manual lifting-out of the catch.

10. A machine as claimed in claim 8 or claim 9, wherein there is moulded in one piece onto the spring web a pressure plate which engages over the long leg and which is constructed, for the purpose of guiding the gripping strip

over into its notching position and lifting the said gripping strip out of the notching position in each case, in such a way that it can be pressed onto the long leg of the gripping strip.

11. A machine as claimed in claim 6, wherein each gripping element is formed by a U-shaped gripping bow, one leg of the U which is fastened, at the end, to the upper side of the grinding plate, and the other leg of the U of which can be pressed, at the end, onto a contact face for grinding paper constructed on the grinding plate and carries, on its inner or outer side, a catch which can be locked in a corresponding catch constructed on the grinding plate.

12. A machine as claimed in any of the preceding claims, wherein the clamping means has a hook and loop-type lining which is injection-moulded onto the underside of the plate halves of the grinding plate in each case.

13. A machine as claimed inany one of claims 1 to 12, further including an electric motor which is constructed as a commutator motor and has a commutator and a brush-holder with at least two carbon brushes which are held in the latter in an axially displaceable manner and press against the commutator under the spring pressure of springs for pressing-on the brushes, which springs are on diametrical sides of the said commutator, and also with at least one capacitor and at least one choke coil for radio interference suppression and a connecting screw for securing a connecting line in position on the brush-holder, the brush-holder being formed by a plastic carrying plate with at least two brush shoes, which are moulded on in one piece, for receiving the carbon brushes, there being fastened to the plastic carrying plate a stamped brass part to which the carbon brushes, the choke coil and the capacitor are connected and into which the connecting screw is tapped, and, when the machine housing is put together from the two housing shells, the plastic carrying plate being received in grooves which

are constructed in a corresponding manner in each housing shell.

14. A machine as claimed in any of claims 1 to 13, further including a plastic push-button protruding from the machine housing for actuating an electrical switch for switching the electric motor on and off, there being moulded in one piece onto the push-button, a resilient web lined, in the end section, with a sheet-metal contact, a notching nose corresponding with a notching indentation in the machine housing, and at least one transversely projecting pin which corresponds with a slot-like recess in the machine housing, and there being screwed into the end section of the web a connecting screw, which passes through the sheet-metal contact, for securing a mains connecting line in position.

15. A machine as claimed in claim 14, wherein the resilient web is shaped in such a way that its end section which is lined with the sheet-metal contact is located, with a switching interval, under a contact tongue which protrudes on the stamped brass part on the plastic carrier plate.

16. A machine as claimed in any of the preceding claims, wherein the fan wheel and the eccentric peg each consists of a stamped sheet-metal part, the stamped sheet-metal parts are put together with their axes disposed eccentrically in relation to one another, and the stamped sheet-metal part which forms the fan wheel includes a collar seated in a non-rotatable manner on the output shaft of the electric motor.

17. A machine as claimed in claim 16, further having a dust-extraction conduit moulded onto the machine housing and a second fan wheel, which is disposed in front of the said conduit, for the extraction of dust from the grinding plate, the stamped sheet-metal part forming the eccentric peg also forming the second fan wheel.

18. Any of the electric hand-held grinding machines substantially as herein described with reference to Figures 6 to 11 of the accompanying drawings.

Amendments to the claims have been filed as follows

1. An electric hand-held grinding machine comprising a machine housing in which is received an electric motor with an output shaft, the housing consisting of two plastic housing shells which are put together along a partition line lying in one plane with the axis of the housing; an eccentric peg which protrudes from the machine housing and is driven by the output shaft of the electric motor; a grinding plate which is received on the protruding end of the eccentric peg and the underside of which is prepared for receiving grinding means; oscillating elements for securing the grinding plate in position on the machine housing; clamping means disposed on the grinding plate for clamping fast the grinding means; and a fan wheel for cooling the electric motor, wherein the grinding plate consists of two plate halves which are put together along a partition line extending in the plane of the partition line of the housing, one grinding plate half and half of the oscillating elements being moulded in one piece onto each housing shell, and the two housing shells and the two plate halves being connectable to one another along their partition lines.

2. A machine as claimed in claim 1, wherein latching elements are moulded onto the two housing shells and the two plate halves for connecting one another together along their partition lines.

3. A machine as claimed in claim 1 or claim 2, wherein the grinding means is grinding paper.

4. A machine as claimed in any of claims 1 to 3, wherein said oscillating elements are formed by plastic webs which extend between the machine housing and the grinding plate at a distance from one another, parallel to one another and concentrically with the output shaft of the electric motor.

5. A machine as claimed in any of the preceding claims, wherein the clamping means are moulded at least onto one grinding plate half in one piece.

6. A machine as claimed in claim 5, wherein the clamping means have two manually actuatable gripping elements which extend on the upper side, which faces away from the underside of the grinding plate, of the said grinding plate, transversely to the partition line of the plate halves, over the entire width of the grinding plate and close to the transverse edge thereof in each case, and the gripping elements are moulded onto the one plate half in one piece.

7. A machine as claimed in claim 6, wherein each gripping element has a gripping strip which is L-shaped in cross-section and the short leg of which is pressed, by its front edge, onto a grinding paper contact face constructed on the upper side of the grinding plate, while its long leg, which extends approximately parallel to the grinding plate, is secured in position on the said grinding plate substantially centrally via a transverse web extending parallel to the short leg.

8. A machine as claimed in claim 7, wherein near the free end of the long leg of the L-shaped gripping strip there is moulded in one piece onto the upper side of the grinding plate a spring web, which is provided with a catch, for locking the gripping strip in its open position in which the front edge of the short leg is lifted off from the grinding plate.

9. A machine as claimed in claim 8, wherein the spring web has a handling tongue for the manual lifting-out of the catch.

10. A machine as claimed in claim 8 or claim 9, wherein there is moulded in one piece onto the spring web a pressure plate which engages over the long leg and which is constructed, for the purpose of guiding the gripping strip

over into its notching position and lifting the said gripping strip out of the notching position in each case, in such a way that it can be pressed onto the long leg of the gripping strip.

11. A machine as claimed in claim 6, wherein each gripping element is formed by a U-shaped gripping bow, one leg of the U which is fastened, at the end, to the upper side of the grinding plate, and the other leg of the U of which can be pressed, at the end, onto a contact face for grinding paper constructed on the grinding plate and carries, on its inner or outer side, a catch which can be locked in a corresponding catch constructed on the grinding plate.

12. A machine as claimed in any of the preceding claims, wherein the clamping means has a hook and loop-type lining which is injection-moulded onto the underside of the plate halves of the grinding plate in each case.

13. A machine as claimed inany one of claims 1 to 12, further including an electric motor which is constructed as a commutator motor and has a commutator and a brush-holder with at least two carbon brushes which are held in the latter in an axially displaceable manner and press against the commutator under the spring pressure of springs for pressing-on the brushes, which springs are on diametrical sides of the said commutator, and also with at least one capacitor and at least one choke coil for radio interference suppression and a connecting screw for securing a connecting line in position on the brush-holder, the brush-holder being formed by a plastic carrying plate with at least two brush shoes, which are moulded on in one piece, for receiving the carbon brushes, there being fastened to the plastic carrying plate a stamped brass part to which the carbon brushes, the choke coil and the capacitor are connected and into which the connecting screw is tapped, and, when the machine housing is put together from the two housing shells, the plastic carrying plate being received in grooves which

are constructed in a corresponding manner in each housing shell.

14. A machine as claimed in any of claims 1 to 13, further including a plastic push-button protruding from the machine housing for actuating an electrical switch for switching the electric motor on and off, there being moulded in one piece onto the push-button, a resilient web lined, in the end section, with a sheet-metal contact, a notching nose corresponding with a notching indentation in the machine housing, and at least one transversely projecting pin which corresponds with a slot-like recess in the machine housing, and there being screwed into the end section of the web a connecting screw, which passes through the sheet-metal contact, for securing a mains connecting line in position.

15. A machine as claimed in claim 14, wherein the resilient web is shaped in such a way that its end section which is lined with the sheet-metal contact is located, with a switching interval, under a contact tongue which protrudes on the stamped brass part on the plastic carrier plate.

16. A machine as claimed in any of the preceding claims, wherein the fan wheel and the eccentric peg each consists of a stamped sheet-metal part, the stamped sheet-metal parts are put together with their axes disposed eccentrically in relation to one another, and the stamped sheet-metal part which forms the fan wheel includes a collar seated in a non-rotatable manner on the output shaft of the electric motor.

17. A machine as claimed in claim 16, further having a dust-extraction conduit moulded onto the machine housing and a second fan wheel, which is disposed in front of the said conduit, for the extraction of dust from the grinding plate, the stamped sheet-metal part forming the eccentric peg also forming the second fan wheel.

18. Any of the electric hand-held grinding machines substantially as herein described with reference to Figures 6 to 11 of the accompanying drawings.

The Patent Office

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Application No: GB 9804523.0 **Examiner:** Dave Butters
Claims searched: 1-18 **Date of search:** 2 April 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): B3D

Int Cl (Ed.6): B24B, B25F

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	EP 0138278 A (EMERSON)(See item 18)	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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